

#4

I hereby certify that this correspondence is being deposited with the U.S. Postal Service by First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231, on the date shown below

Dated: 7/3/02

Signature Eileen Sheffield
(Eileen Sheffield)

Docket No.: CERA-240 (10202037)
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Bindig, et al.

Application No.: 10/081,927

Group Art Unit:

Filed: February 21, 2002

Examiner:

For: PIEZOCERAMIC MULTILAYER ACTORS AS
WELL AS A METHOD FOR THEIR
MANUFACTURE

Commissioner for Patents
Washington, DC 20231

Dear Sir:

PRELIMINARY AMENDMENT

In advance of prosecution, please amend the above-identified patent application as follows:

IN THE CLAIMS

Cancel claims 1-26, without prejudice and add the following new claims:

27. Piezoceramic multilayer actuator with internal electrodes led out alternately to opposite surfaces of the actuator, which internal electrodes are interconnected on the respective surface of each by an external electrode, which consists of at least one layer of a base metallisation deposited on the inactive region of the actuator, by means of which base

metallisation a reinforcing layer is connected by means of an interconnecting layer, to which reinforcing layer a connection to a voltage source can be soldered, characterized in that the surface of the multilayer actuator has a structure in the inactive region that is produced by erosions interrupting the surface, and that the base metallisation is deposited exclusively on the surface left by the structure .

28. Piezoceramic multilayer actuator according to Claim 27, wherein the depth of the erosions producing the structure corresponds to the thickness of the insulating region at the surface of the actuator .

29. Piezoceramic multilayer actuator according to Claim 27, wherein the depth of the structure is up to approximately 0.5 mm.

30. Piezoceramic multilayer actuator according to Claims 27, wherein the erosions of the surface of the actuator, producing the structure consist of grooves .

31. Piezoceramic multilayer actuator according to Claim 30, wherein the grooves are disposed parallel to one another.

32. Piezoceramic multilayer actuator according to 30, wherein the width of a groove, the spacing between two grooves and the angle of these grooves with respect to the longitudinal axis of the actuator are adjusted with respect to one another so that no more than a predetermined number of internal electrodes occurs between two grooves at the surface of the actuator.

33. Piezoceramic multilayer actuator according to Claim 30, wherein the width of the grooves is 0.2 mm to 2 mm, preferably 0.2 mm to 0.7 mm.

34. Piezoceramic multilayer actuator according to Claim 30, wherein the grooves are disposed at a spacing of 0.2 mm to 10 mm.

35. Piezoceramic multilayer actuator according to Claim 32, wherein the optimum number of internal electrodes that occurs between two grooves at the surface of the actuator is approximately five and thus the spacing of the grooves between one another is approximately 0.8 mm to 1.2 mm.

36. Piezoceramic multilayer actuator according to Claim 30, wherein the grooves run at an angle of 0 degrees to 80 degrees, preferably from 30 degrees to 50 degrees, to the longitudinal axis of the actuator .

37. Piezoceramic multilayer actuator according to Claim 30, wherein the structure is a grid of crossing grooves .

38. Piezoceramic multilayer actuator according to Claim 27, wherein the structure is produced by a machine cutting process.

39. Piezoceramic multilayer actuator according to Claim 27, wherein the structure is produced by a laser process.

40. Piezoceramic multilayer actuator according to Claim 27, wherein the structure is incorporated in the surface in the green state of the actuator.

41. Piezoceramic multilayer actuator according to Claim 27, wherein the structure is incorporated in the surface in the sintered state of the actuator.

42. Process for the manufacture of a piezoceramic multilayer actuator according to Claim 27, wherein a structure is produced on the surface of the inactive region of the actuator by erosions in the surface, and that for connecting the internal electrodes, the base metallisation is deposited exclusively on the surface left by the structure.

43. Process according to Claim 42, wherein to produce the structure, the surface is eroded to a thickness that corresponds to the thickness of the isolating region.

44. Process according to Claim 42, wherein grooves are produced in the surface of the actuator.

45. Process according to Claim 44, wherein the grooves are disposed in parallel.

46. Process according to Claim 44, wherein the width of a groove, the spacing between two grooves and the angle of these grooves with respect to the longitudinal axis of the actuator are adjusted with respect to one another so that no more than a predetermined number of internal electrodes occur between two grooves at the surface of the actuator.

47. Process according to Claim 46, wherein the number of internal electrodes that occurs between two grooves in the surface of the actuator is set at five.

48. Process according to Claim 44, wherein the grid structure is produced by crossing grooves.

49. Process according to Claim 42, wherein the structure is produced by a machine cutting process.

50. Process according to Claim 42, wherein the structure is produced by a laser process.

51. Process according to Claim 42, wherein the structure is produced in the green state of the actuator.

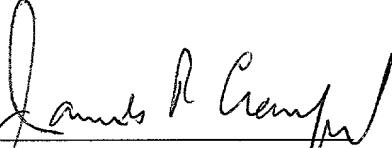
52. Process according to Claim 42, wherein the structure is produced in the sintered state of the actuator.

REMARKS

The purpose of this amendment is to conform the claims to U.S. practice. If any additional fees are due to enter this amendment, authorization is given to charge deposit account no. 50-0624.

Respectfully submitted,

Dated: July 3, 2002

By 
James R. Crawford
Registration No.: 39,155
FULBRIGHT & JAWORSKI L.L.P.
666 Fifth Avenue
New York, New York 10103
(212) 318-3000
(212) 318-3400 (Fax)
Attorneys for Applicant